



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/619,348	07/14/2003	Daoqiang Lu	Intel/16653	6350
34431	7590	07/21/2005	EXAMINER	
HANLEY, FLIGHT & ZIMMERMAN, LLC 20 N. WACKER DRIVE SUITE 4220 CHICAGO, IL 60606			WILSON, CHRISTIAN D	
			ART UNIT	PAPER NUMBER
			2891	

DATE MAILED: 07/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/619,348

Applicant(s)

LU, DAOQIANG

Examiner

Christian Wilson

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 17 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 12292003.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: search history.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 16 recites the limitation "core" and "solder covering". There is insufficient antecedent basis for this limitation in the claim. For the purposes of examination, it will be assumed that claim 16 depends from claim 15.

### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1 – 3 and 5 – 10 are rejected under 35 U.S.C. 102(e) as being anticipated by

Miller *et al.*

Art Unit: 2891

Miller *et al.* (US 6,759,687) discloses a method to control the distance between a chip die and a substrate [Figure 2] comprising coupling at least one spacer 66 to the substrate 42 and bonding the chip die to the substrate [column 5, lines 10-25] such that the spacer defines the distance between the die and the substrate [column 5, lines 35-45].

Regarding claim 2, Miller *et al.* further discloses a ball spacer [Figure 2].

Regarding claim 3, Miller *et al.* further discloses flattening one end of the spacer [column 5, lines 19-22].

Regarding claim 5, Miller *et al.* further discloses a flip chip die [column 2, line 55].

Regarding claim 6 Miller *et al.* further discloses optically coupling an optical element 44 to a waveguide 52.

Regarding claims 7 and 8, Miller *et al.* further discloses a conductive solder pad 58.

Regarding claims 9 and 10, Miller *et al.* further discloses forming an electrical connection with a solder joint [column 5, lines 15-20; column 6, lines 40-45].

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miller *et al.* in view of Tomita *et al.*

Miller *et al.* teaches the limitations of claim 1 as described above, but does not discuss a spacer with a core and solder covering. Tomita *et al.* (US 5,666,008) teaches a solder ball with a core and solder covering [Figure 4]. It would have been obvious to one of ordinary skill in the art to use the solder ball of Tomita *et al.* in the method of Miller *et al.* since the dual layer solder ball prevents accidental melting of the contact pads [column 9, lines 5-10].

7. Claims 11, 12 – 14, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller *et al.* in view of Reedy *et al.*

Regarding claim 11, Miller *et al.* teaches bonding the chip to the substrate, but does not describe using a thermocompression method. Reedy *et al.* (US 6,583,445) teaches a thermocompression method [column 13, lines 40-55]. It would have been obvious to one of ordinary skill in the art to use thermocompression in the method of Miller *et al.* since thermocompression is well known in the art for bonding flip chip devices.

Regarding claim 12, Miller *et al.* discloses a method to mount an optical flip chip die [Figure 2] comprising coupling at least one spacer 66 to the substrate 42 and bonding the chip die to the substrate [column 5, lines 10-25] such that the spacer defines the distance between the optical flip chip 44 and the waveguide 52 [column 5, lines 35-45]. Miller *et al.* teaches bonding the chip to the substrate, but does not describe using a thermocompression method. Reedy *et al.* teaches a thermocompression method [column 13, lines 40-55]. It would have been obvious to one of ordinary skill in the art to use thermocompression in the method of Miller *et al.* since thermocompression is well known in the art for bonding flip chip devices.

Regarding claim 13, Miller *et al.* further teaches a ball spacer [Figure 2].

Art Unit: 2891

Regarding claim 14, Miller *et al.* further teaches maximizing the optical coupling between the optical flip chip and the optical waveguide [column 2, lines 5-10].

Regarding claim 17, Miller *et al.* further teaches forming an electrical connection with a solder joint [column 5, lines 15-20; column 6, lines 40-45].

8. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller *et al.* and Reedy *et al.* as applied to claim 12 above, and further in view of Tomita *et al.*

Miller *et al.* as modified by Reedy *et al.* teaches the limitations of claim 12 as described above, but does not discuss a spacer with a core and solder covering. Tomita *et al.* teaches a solder ball with a core and solder covering [Figure 4]. It would have been obvious to one of ordinary skill in the art to use the solder ball of Tomita *et al.* in the method of Miller *et al.* since the dual layer solder ball prevents accidental melting of the contact pads [column 9, lines 5-10].

### ***Conclusion***

9. A copy of the search history is enclosed.


10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian Wilson whose telephone number is (571) 272-1886.

The examiner can normally be reached on weekdays, 7:30 AM to 4 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2891

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'CDW', with a large, stylized loop at the end.

Christian Wilson, Ph.D.  
Primary Examiner  
Art Unit 2891

CDW